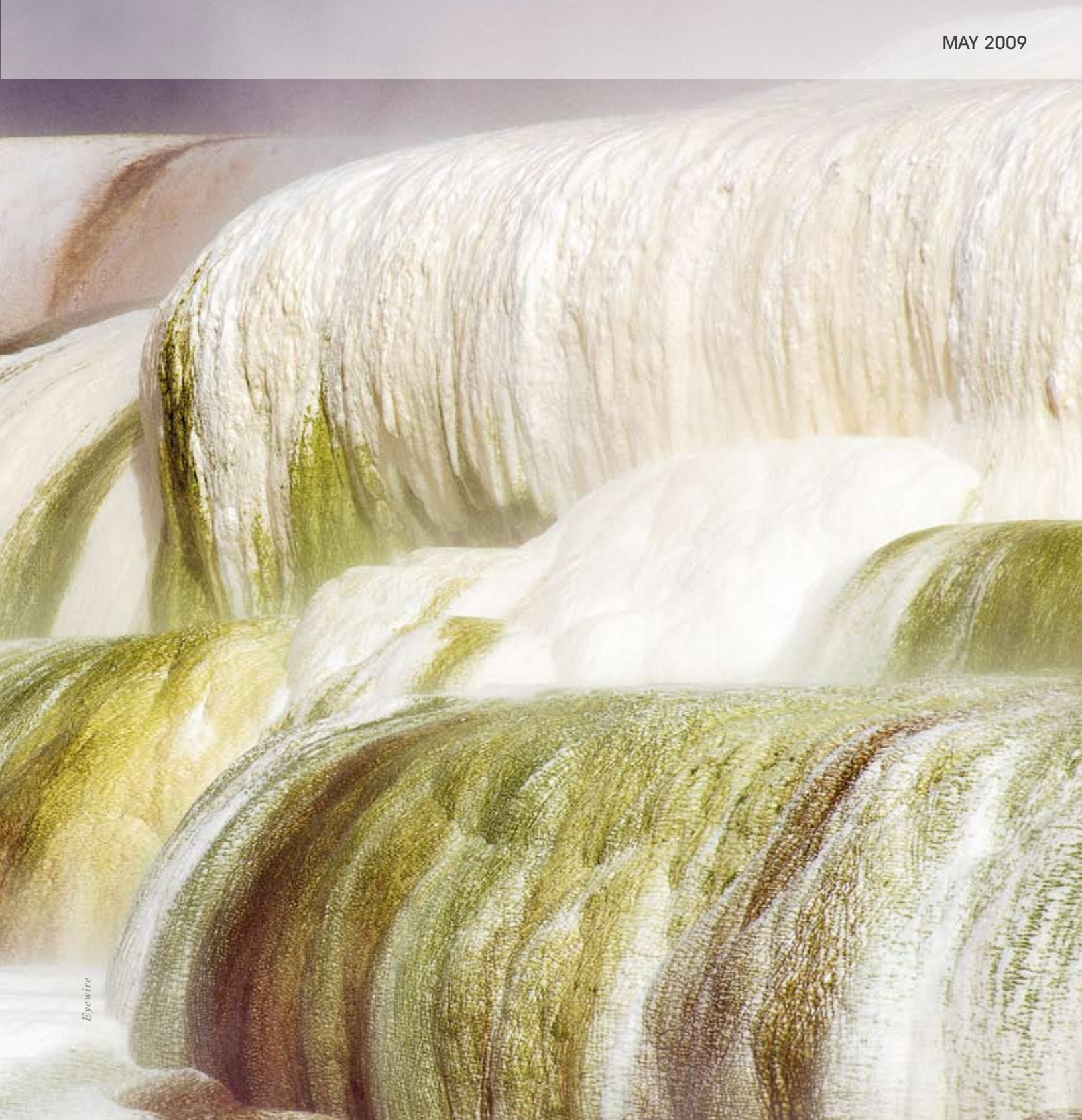


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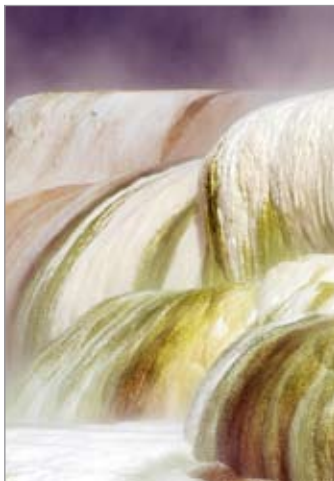
# Valuation & transparency

MAY 2009



In this sponsored question and answer forum, representatives from CAPITECTS, Fitch Solutions, Standard & Poor's, Pricing Partners and Bloomberg discuss the changing nature and landscape of risk management in current market conditions and what this means for the future of structured products and for those who buy and sell them

# The landscape is changing



> Risk management and, in turn, valuation have never been so important to the structured products market. Whereas valuations were once looked upon as an inexact science that practitioners often ended up having to live with, one great big crisis later and all has changed.

Whether marking to market or projecting the price or value of new products, the enabling technology is now firmly embedded in the plans and strategies of banks that have either lost loads of money or those that have lost gargantuan amounts. Oddly, the time to invest in all of this technology would logically be when the going is good and profits are free and easy. Not so. But then it was not only rational exuberance that meant there seemed like no need, it was a more a case that the valuation of risk had become almost a moot point. More specifically, the price or value of risk was a tiny part of the cost.

Then along came real risk with the bankruptcy of Lehman Brothers, and the science, pricing and valuing of risk has been reinvented, and the need for calculation tools has been put back to the top of the list.

Ultimately, what is required is a way to value and model risk that is universally accepted. While the Black-Scholes model may be known for its imperfections, at least everyone knows them and at the same time accepts this as a universal model. The cry now is for a similar modelling system – universally appreciated and adopted, and hopefully accurate in the main – which will help the structured products market mature. This increment to the development of the market – the reasonable acceptance of valuations – will also be invaluable to the further efficiency and use of a secondary trading market, which would offer much needed liquidity and transparency to the proceedings.

This section of the magazine includes a series of sponsored articles that address the valuation issues that are relevant to today's markets in the form of a sequence of Q&As that remark on how we ended up here and why, and where we go from now.

**Richard Jory**  
Editor, *Structured Products*

# The landscape is changing

How are the rapidly changing needs of clients, regulators and the financial industry generally being met?

**Paolo Sironi (PS):** At CAPITECTS we believe that intuitive financial intelligence can be provided to distribution networks and investors to compensate for the complexity of rapidly changing financial markets. Investors' protection can be fostered by means of transparent decision-making, which contributes to running financial businesses in ethical and sustainable ways as a driver of reputational risk mitigation.

However, under the current regulatory regime, a healthy balance has not yet been achieved between the provision of all the necessary information for investors to make informed decisions and, at the same time, ensuring that the prospectus is comprehensible and 'user-friendly'.

To achieve this objective, the Markets and Financial Instruments Directive and its implementing regulation are undertaking a revision of the requirements for the prospectuses of financial instruments, among which are structured products.

**Frank Ciccotto (FC):** Standard & Poor's Securities Evaluations sees the most significant needs around price transparency or the concept of price defensibility. An evaluation must be able to stand up to rigorous analysis by risk managers, compliance officers or the board of directors. To ensure this requirement, valuation providers are enhancing their offerings and delivering supporting data, including market prices and assumptions underlying the price.

**Eric Benhamou (EB):** On the one hand, the needs of asset management firms, hedge funds, auditors, regulators and, more generally, the buy-side community for more transparency have been met by the emergence of new players such as Pricing Partners, your independent valuation expert. As new actors in the valuation business, we are totally independent and possess the same skill set as the best investment banks. This is because we are founded by former professionals of the trading floor who are familiar with the intricacies of structured products. This has definitely helped the buy-side community to better understand their structured products and derivatives position.

But, on the other hand, the financial industry is still looking for a new soul. There is still a great need to make progress in the risk management of structured products and to adopt the tools, services and solutions that are no longer black boxes. Price-it® Online, Pricing Partners' independent



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valuation platform, is certainly going in the right direction. And it is not surprising that it has been a great success with structured products investors. The main reasons for this are that it is an intuitive solution covering all major asset classes: interest rates, equity, inflation, credit, foreign exchange, commodities, life insurance and hybrids.

### How have client valuation and/or transparency requirements changed? Has the marketing proposition of distribution networks for financial products evolved, and what is the focus today?

**PS:** Principles-based regulation has failed to provide an effective common playing field where banks can thrive and clients are protected from excessive speculation. Therefore, the current regulatory framework shall be amended to achieve effective harmonisation across markets, legislations, products and intermediaries. The experienced drawbacks of persisting segmentation in regulatory principles and approaches highlights the relevance of ensuring, at the point of sale, a consistent level of information concerning any financial product, the risks associated with the investment opportunities and the relevant costs and charges for the clients.

Distribution networks will, therefore, be required to enhance marketing propositions with coherent and intuitive representation of all financial products characteristics in the context of real portfolios and real investors' profiles.

Effective transparency is a fundamental principle that is currently holding a central spot in the debates of many regulators and policy-makers worldwide.

Just as US President Barack Obama stated when he addressed the key principles for transforming the US regulatory system: "Supervise financial products based on actual data on how actual people make financial decisions."

### How have traditional risk management techniques fared though the recent turmoil?

**PS:** The industry has widely underestimated the difference between effective risk management and sophisticated risk measurement. Traditional risk management techniques widely based on value-at-risk (VAR) are, by themselves, not adequate to facilitate effective decision-making. This can be seen, among other factors, from deficits in liquidity management, where severe stress-test scenarios become reality. VAR is not a panacea and works as a measure only under normal market conditions, where breaches in capital limits, as well as deviations from medium-term levels, might indicate excessive risk-taking or improper portfolio hedging. However, even under normal market conditions, VAR cannot measure all risk factors underlying innovative financial products. Most of all, VAR is not capable of facilitating 'what-if' decision-making under extreme market conditions, such as those observed during the current financial crisis.

Just as former US President Dwight D. Eisenhower said: "The plan is useless, it is the planning that is important", VAR is essential in planning before the battle. However, once the battle has commenced it becomes of little use.

We at CAPITECTS believe that risk management is about enabling

management to run financial businesses in sustainable and profitable ways, even under severe stress conditions. Business profitability is fostered by timely and transparent decision-making that only scenario-based approaches can facilitate.

**EB:** First of all, the current crisis has amplified the necessity of independent valuation for structured products and other over-the-counter products. This need existed before but has now been amplified. Clients not only want a number, but also tools, dashboards and figures to completely understand the valuation and the risks connected to their derivatives. They are looking for better solutions to risk-manage their portfolios and to anticipate the evolution of their financial products.

Secondly, counterparty risk has become a major issue. After the collapse of Lehman Brothers', the financial world suddenly realised that venerable institutions could fall. In this field, Pricing Partners has been one of the pioneers with a methodology extracting counterparty risk from the credit default swaps (CDS) market.

### What is so important about scenario-based risk management?

**PS:** Scenario-based risk-return management is fundamental to 'anticipate' the potential impacts of periods of financial turmoil. This approach compensates for deficiencies in financial and portfolio models, because it allows to stress test economic capital conditions and hedging strategies under shifted market conditions and changes in the structure of correlations. Risk management purely derived from historical data will always fail to describe the full range of future uncertainty.

Individuals are more likely to buy house insurance to cover against fire if they or their neighbours have experienced it in the past. However, the lack of past occurrence does not mitigate the negative effects of a potential fire in the future.

Going back to strategic military thinking, traditional models can handle with approximation-only known-known, known-unknown and unknown-known events. Unknown-unknown situations instead, like black-swan events, can only be handled by intuitive scenario-based risk management, which enables understanding their potential impact on business sustainability.

**Ahmet Kocagil (AK):** Structured finance assets are highly complex in structure and require a number of modelling assumptions. Neither top-down methods nor time-saving approximations (for example, mapping to an index or treating assets with similar risk features as identical) are advisable to understand the true nature of the payout of these type of assets. Thus, in order to obtain an in-depth understanding of the exact nature and shape of the distribution of the payouts and their sensitivities to changes to the underlying model assumptions, it is advisable to obtain the estimates that correspond to these 'delta' scenarios as well. For instance, structures with triggers to switch from sequential to pro-rata payouts or that have cliffs in the waterfall will have very different values when modelled across multiple scenarios, which are rarely captured

if analysed through approximations. Accordingly, Fitch Solutions SES offers step-by-step and transparent evaluations under a wide range of assumptions and economic scenarios to clients.

**FC:** Market uncertainty, a lack of liquidity and an overall crisis sentiment are combining to create a disrupted relationship between market-observed pricing and the intrinsic value of structured assets on investors' balance sheets. Portfolio decisions hang in the balance awaiting transparent valuations and risk assessments. Scenario-based risk management is essential in establishing a decision-making process in the face of illiquidity or distressed market pricing. Standard & Poor's Valuation Scenario Services assist investors in analysing their portfolios against a multitude of potential economic scenarios to get a clearer picture of the value of the paper they are holding.

The Valuation Scenario Services exercise produces a wealth of market intelligence, which, when taken at face value, provides a foundation for understanding the predicament global financial institutions currently find themselves in and the challenges policy-makers must overcome to counteract the global credit crunch.

**EB:** Again, I am emphasising how important it is to really understand the underlying assumptions in our valuation. Consequently, it becomes crucial to be able to measure the impact of these assumptions on your valuations. That is where scenario-based risk management brings some real added value. One major reason for the overestimation of subprime products was the assumption that housing prices could not decline. This assumption now seems ridiculous. But this shows how important it is to really understand the assumptions made behind the scenes. This is one of the major benefits of the scenario-based approach.

### What are the benefits of scenario-based decision-making? Why are forward-looking scenarios integral to decision-making?

**PS:** Scenario-based decision-making places intuitive financial intelligence at the centre of investment advisory since it fosters transparency and simple communication. Based on our findings, meaningful investment advisory can only be achieved by complying with the following guidelines:

- Assessment of the time horizon underlying new investments to disclose potential liquidity concerns induced by individual products.
- Alignment of the risk profiles (at given time horizons) of financial products with those of non-professional clients.
- Simulation through time of product and portfolio potential returns, comparing cost-benefit relationships at appropriate investment horizons.

These guidelines can be fulfilled simply via the utilisation of an easy-to-use yardstick that is able to match the nature of investors and the financial characteristics of retail products.

This yardstick is mark-to-future scenario-based risk management, since it allows individuals of widely different backgrounds and perspectives

to engage in meaningful discussions about risks and potential returns. Moreover, scenario-based techniques allow comparison of complex products on a single scale by accurately describing the potential future returns without overly simplified representations of complex mathematical characteristics into standardised asset classes.

**EB:** This has already been answered in the previous question. In short, the scenario-based approach allows a better understanding and a more global picture of the potential evolution of your structured products with simple and comprehensible assumptions. As long as you do not get the global picture, you can be assured of making mistakes in your investment decisions. This is something we always keep in mind when doing our job as independent valuation experts at Pricing Partners.

### Why is transparency fundamental to simplifying investors' decision-making? How important is transparency in financial planning and how can it be achieved?

**PS:** Notwithstanding the strengthening of the regulation in recent years, clients do not seem to read or fully understand financial prospectuses. The current crisis of confidence has induced many investors to hold back, but this can only be temporary. Therefore, highly reputable and ethical financial businesses will gain back the trust of their respective and potential clients by making transparency a driver of the financial planning process.

Transparency goes well beyond compliance to documentation: it will entail the delivery to the distribution networks of the most appropriate tools in order to simplify investors' decision-making. Distribution networks will be asked to compete on effective transparency and efficient solutions. This will foster market competition and will delevage the placing power of networks if not supported by easy-to-use architectures. CAPITECTS is therefore committed to providing the most appropriate solutions for delivering financial intelligence via intuitive and graphical representation of the complex characteristics of financial planning tasks.

**EB:** The current crisis has cast many doubts over observed market prices. The buy-side world is a bit lost with these brutal changes. If we take, for instance, the case of structured products issued by AIG, suddenly, within a few days, these products lost 40% of their value just because of the counterparty risk. In addition, the price remains theoretical, since hardly anyone was ready to trade these and investors were stuck with their financial products. This explains why investors really want to understand what the key elements in valuations are. They want to have a fair and objective assessment. They also want to know all the details in the valuation and have a good understanding about the modelling assumptions. This is where Pricing Partners can obviously bring a real solution. Recently, Pricing Partners went one step further in releasing a source code solution of its pricing analytics, providing our clients access to the ultimate details of our analytics implementation and providing full transparency on our models, numerical methods and calibration algorithms.

## Comparative to traditional risk management techniques, what are the advantages of the scenario-based framework?

**PS:** CAPITECTS provides financial institutions with inexpensive managed service solutions for financial intelligence. This creates the intuitive communication layer supporting consistent actions along the organisational chain. The resulting alignment of internal and external stakeholders' interests is also a key element of the lesson learned from the current financial crisis, being paramount to strengthening financial institutions and enabling them to not only thrive under normal market conditions but also to sustain profitability during periods of financial turmoil.

## What are the advantages of the marked-to-model approach?

**EB:** The marked-to-model approach has the merit of always providing prices on all asset types. It has the additional advantage of connecting liquid and non-liquid assets and of defining a price using scientific methods with a rigorous evaluation of risk. Of course, this should be done with all the reserves mentioned previously. In this area, Pricing Partners has a unique position giving it a strong competitive advantage. Pricing Partners is one of the only shops that both develops its models and analytics and uses them in its independent valuation service. This is obviously done with total transparency as we sell our pricing library, making it, in a sense, public. The combination of these two jobs gives us a deep quantitative knowledge that gives us a hedge to provide very accurate valuation. This comes from our intimate knowledge of analytics. Without this thorough understanding of all the mechanisms of the valuation process, it remains very difficult to grasp the key factors of the fair price determination. And it is not surprising that banks are still keeping this quantitative expertise in-house with their famous battalion of 'quants' to have in-depth knowledge of their valuations assumptions.

## What does the future hold for the structured products industry?

**PS:** Structured products are still a fundamental opportunity for institutional and non-professional investors. They can efficiently achieve a desired mix among risks and return opportunities over time. Due to the current market conditions, there is a trend of simplification in the banks' offerings. At the same time, the financial industry and the regulators are calling for the deployment of solutions to support transparent, intuitive and simple decision-making. This has certainly been a missing element in the extraordinary but disorderly evolution of financial markets in recent years.

The solution to an excess in financial fantasy is not the denial of the innovation benefits but the strengthening of the clients' intuition of the products' risk-return costs characteristics when discussing investment opportunities.

**EB:** We will certainly evolve towards simpler structured products. Customers have been burnt by increasingly complex products. In the short term, investors are looking for products on secured and non-

volatile underlyings like ones based on money markets. But, in the long term, investors should come back to equity-linked products as the equity market may reach its low point one day. It will take time for investors to return to structured credit products like collateralised debt obligations as they have been strongly associated with the financial crisis. Also, inflation should interest investors. But one thing is certain: customers want more understandable and more transparent products valued by an external independent valuation expert. In this area, Pricing Partners can play a major role by providing an effective response to transparency – better risk management – leading to better investment decisions.

**Mirko Filippi (MF):** Contrary to the original purpose of the development of structured products, their tailor-made essence, we are witnessing a 'standardisation' of payoffs and derivative types. This simplification process breeds extra appetite in the financial industry for solid, outsourceable, scalable, automated infrastructure able to handle significant flows (at pre-trade, trade capture, risk management, settlement) and minimise operational risks.

Besides, a significant accumulation of exotic structures continues to sit in portfolios of institutional investors and dealers, demanding mark-to-model appraisals by an independent third party that can ensure model and data transparency, a valid and uniform incorporation of the counterparty risk in the valuation process.

Bloomberg offers a complete solution for OTC derivatives and structured notes across asset classes and at different levels of the derivatives flow. Our analytics screens are widely used in the market as standard for valuation and communication between counterparties; they allow the structuring of complex deals (also from Excel), they are fully integrated in a comprehensive and entirely managed database and to our proprietary trading and portfolio management systems.

## How have traditional risk management techniques fared though the recent turmoil?

**AK:** The massive writedowns in the recent past have demonstrated that top-down evaluation methods, albeit time-efficient, can be deceiving and are likely to produce misleading results. In order to better assess the intrinsic value of structured assets (especially for mortgage-backed securities and asset-backed securities) it is advisable to utilise a bottom-up type of approach, where the analysis starts with probability of default and severity calculations at the loan level using loan-specific details, which then are aggregated to the bond level (and to further complex structures if and when needed). This way any disproportionalities in the pool that may be caused by an individual or group of loans/assets can be identified and the pool structure can be examined accurately in detail.

**EB:** The value-at-risk (VAR) approach has shown its limitations. Imperfections in Black-Scholes models were salient as well. And, it is striking to see that the models that worked the best during the crisis were the most advanced ones. Regarding risk measurement, it appears that, in the first instance, conditional-VAR approach stress scenarios can partially fill the gap. Secondly, the financial industry realised that new risks (for

example, counterparty risk already mentioned), dividend risk and basic assumptions had to be revisited. You cannot assume constant dividends in an environment where dividends are plummeting sharply.

The new environment has shown how important it is to really understand the scope and the implications of the implicit assumptions we make. And, if you do not have critical judgement, you could get your fingers burnt. A typical example is the recovery rate used in the CDS market, in which Pricing Partners has been one of the pioneers. Many actors marked their recovery at 40% even though we saw between 5% and 10% recovery in recent bankruptcy cases. But, if you are smart, you can figure out how to back out the recovery rate from the CDS underlying the bond and infer more realistic recovery rates. This is exactly what we do at Pricing Partners.

### How can investors assess the intrinsic value of structured assets and complex securities in the present uncertain and illiquid markets?

**AK:** Fitch Solutions Securities Evaluation Service (SES) approach starts by obtaining cashflows at the aggregated bond level as the output; accordingly, our methodology produces simulated cashflow results that span the range of the underlying assumption vectors (for example, interest rates and prepayment assumptions). Subsequently, the cashflows are discounted to obtain the present value of the expected cashflows for the analysed security. Note that there are a number of assumptions feeding into the evaluation models. In addition, the structures of these assets can be fairly complex. Consequently, the sensitivity of the output can be highly non-linear. Using Fitch Solutions' methodology, one can easily discern the nature and the shape of an asset's payouts and better assess its value.

### With the onset of the regulatory landscape changing, it is clear that transparency in portfolios is now a priority. But how does an institution achieve this?

**AK:** Transparency has indeed become a high priority among the institutions we are working with and we see three dimensions to it:

- Transparency of methodology.
- Transparency of assumptions.
- Transparency of intermediate outputs.

In other words, the institution asking for external valuation assistance needs to understand and be comfortable with the overall methodology that is being implemented; and it needs to know the nature and extent of the assumptions that are utilised and should be able to follow the calculations throughout (for both baseline and delta scenarios). We at Fitch Solutions strive to provide this level of transparency and have had several client situations where the firms were previously receiving values essentially from a provider that offered them solutions as a 'black box'. Financial institutions find this frustrating and want to be able to understand the context of how the values were derived, for – even if the values by themselves may be fine for accounting purposes – without the transparency they are not particularly helpful when managing a book.

**EB:** The liquidity crisis has highlighted the importance of having clear ideas on future cashflows. But this financial planning exercise is relatively difficult on structured products as future cashflows are not known. Very few tools offer the ability to give the average future cashflows and their distribution. At Pricing Partners, we understood this was a major concern and we quickly set this up in Pricing Partners' solutions. Today – thanks to the ability to analyse and audit any financial product booked via our internet independent valuation platform, Price-it® Online – we can extract from Excel all the cashflow values and distribution of a structured product.

### What are the key components of a successful valuation service?

**AK:** We believe that a successful valuation service needs to be independent, accurate, transparent, flexible and needs to have a reliable technological backbone to address eventualities. Any service that poses a conflict, for example, because of a sister asset-management business, cannot achieve independence in valuation. Similarly, providers that offer their services only in an opaque manner, or do not address the client's requests, for example, for flexibility of assumptions, cannot meet the increasing demand for transparency in the market. Finally, small providers that lack institutionalisation and a secure and reliable infrastructure (with security, back-up and emergency recovery features) cannot be successful in the current environment.

### Do you see methodology and strategies for the pricing of illiquid assets changing in the aftermath of the financial crisis?

**FC:** Standard & Poor's offers Valuation Scenario Services, an alternative evaluation approach. The analytics provided by Valuation Scenario Services offer step-by-step, transparent assessment of their structured portfolios under a range of different assumptions and economic scenarios. This information is then reviewed in a collaborative decision-support process with clients to establish a better understanding of structured credit portfolio value.

### Following the credit crunch, regulators have expressed a growing interest in valuation processes. Is there a need for increased regulatory involvement?

**FC:** In today's marketplace, regulators are seeking to maintain a balance between 'mark-to-market' and other market pressures that impact on how securities are valued. This is especially true when evaluating structured finance and other less liquid types of securities, including collateralised loan obligations, collateralised debt obligations and mortgage-backed securities. The ability of regulators to provide the marketplace with an acceptable method to address mark-to-market, as well as helping it effectively manage the call for additional valuations, is paramount to the pricing process. At Standard & Poor's we have the ability to provide the marketplace with two types of approaches: the mark-to-market approach; and the independent model-based value approach through our Fixed Income Risk Management Services Group.

While the market has seen a rapidly growing demand for independent valuations in the past year, third-party vendors have focused on expanding offerings and helping clients meet new requirements. But have vendors expanded too fast to meet client expectations for these services?

**FC:** Standard & Poor's Securities Evaluations has taken a conservative approach to the expansion of asset-class coverage and we have maintained a market approach to pricing. Critical to our approach for expansion is the ability to secure ongoing reference data, availability of market data inputs, experienced pricing analysts that can interpret, manage and react to these inputs and the ability to integrate these new asset classes into our current work flow, processes, pricing systems and oversight procedures.

How has the marketing proposition of distribution networks for financial products evolved, and what is the focus today?

**EB:** Due to customers' lack of interest in new structured products, investment banks have suddenly grasped that they had to do something for greater transparency and give their final clients access to independent valuation providers. In Europe, this is particularly true for the insurance industry with strong incentive from regulation. In the French market at least, banks like Société Générale or BNP Paribas have quickly realised this new environment and have been seeking the services of Pricing Partners.

What is the future for independent valuation experts?

**EB:** We expect this market to consolidate around companies with real expertise. Certainly, Pricing Partners has a role to play as it is unique in that it both develops and sells its own analytics and, at the same time, uses them in its independent valuation service role. As mentioned already, this gives Pricing Partners a competitive advantage in terms of strong quantitative expertise and greater flexibility.

Last, but not least, Pricing Partners is about to launch an extensive developers' partner programme that will give access to its modelling and analytics technology. This new programme will offer its flagship Price-it® product free of charge to qualified developers to drive innovation and early adoption of its ground-breaking technology. Imagine a world where all the structured products were described according to the Price-it® language. There would then be no more ambiguity about the characteristics of financial products as Price-it® corresponds to a scientific rigorous description of the cashflows of a financial product. Pricing Partners spent time and effort to standardise all structured products on all major asset classes. In a world where Price-it® language will be the standard, we will certainly reach a hitherto unseen level of transparency.

How is the current market instability affecting the derivatives and structured products market?

**MF:** Structured products, as well as their component over-the-counter (OTC) derivatives, have been conceived over the last three decades to fulfil a variety of diverse needs in the marketplace. To name a few: create increasingly efficient vehicles to transfer or limit risk; reduce funding

costs; generate yield enhancement; tailor cashflow profile and timing; hedge exposure to first- and second-order greeks; improve hedge effectiveness; grant access to otherwise unreachable investments; and channel asymmetric payoffs to retail clients.

First- and second-tier banks have invested heavily in creativity; in other words in personnel with advanced mathematical knowledge, focused on developing instruments able to capture all the possible nuances of investors' financial appetite.

A feature common to all asset classes has been the steadily increasing complexity, which has materialised under the form of a more complex underlying portfolio (i.e., collateralised debt obligation cubed), or the attempt to apply a financial engineering concept successfully within one asset class (i.e., range accrual on rates) into another (credit default swap (CDS) range accrual), or the combination of exposures on different asset classes (hybrids), or the generalised adoption of early redemption clauses (callability, autocallability, target accrual redemption note, etc.) and digital payoffs.

While, for a large variety of products, the engineering process has undoubtedly created value, by the turn of the second half of this decade the market witnessed a damaging over-engineering across asset classes and product types (OTC derivatives, structured bonds and structured products referenced to pooled assets).

The current market instability and liquidity crisis have forced institutions to lower their level of risk appetite also by opting for derivatives and structured notes with more linear and simplified payoffs; essentially, we are back to basics (at least for the time being).

Can your clients cope with the changing regulatory requirements?

**MF:** The growth of the structured products market has been accompanied by mounting regulatory anxiety and increasing legislation, with regulatory concerns echoing across several components of the derivatives flow:

- The transparency of the product features;
- the separation between 'flow' structures and 'exotic' structures;
- the efficiency of the secondary market;
- the hedge effectiveness; and
- the detail of risk-reporting and scenario analyses.

Under FAS 157, our clients must measure fair value by separating and classifying securities following three decreasing degrees of 'observability' of their inputs. Level 1 securities (where inputs are market-observed and usually exchange-traded) follow a mark-to-market pricing approach and the main challenge faced by our clients is infrastructural.

Level 2 and 3 securities (that are characterised by less observable inputs) require a more radical pricing approach called mark-to-model.

We fulfil diverse needs from our clients in the marking-to-model process:

- Understand the deal confirmation;
- gather, manage and retrieve correctly a very large amount of market data;
- develop and calibrate the correct model; and
- automate the entire pricing process for better efficiency and reduced operational risk.

Additionally, IAS 39 requires that all derivatives (also in some cases



those embedded in a host contract) must be recognised at fair value. We provide valuation tools that can extract and isolate from a structured note all of its component options (such as caps, floors, ranges, equity basket premium, etc.).

IAS 39 moreover obliges hedge effectiveness to be assessed both prospectively and retrospectively; this requires portfolio hedging capabilities and meaningful historical data sets.

### Why is data quality one of the most important factors in valuing a derivative?

**MF:** Recurrently, data represents the factor to blame for the difficulty of matching the note value on pretrade, or to reconstruct its meaningful reconciliation.

There are at least three variables that must be carefully considered:

- *The data source.* Finding comprehensive and easily decipherable data requires economies of scale and the design and implementation of a market data management system.
- *The data construction.* A striking example is the assembly of interest rate curves, where a variety of building blocks (cash fixings, real-time deposit rates, forward rate agreements, futures and swap rates) can be combined; other relevant effects of the credit crisis are the increasing liquidity on overnight index swap curves and the significant mismatching across mono-currency basis curves. An even more complex case is the stripping of our volatility cube where Bloomberg presents very transparently how we select market quotes for swaptions, caps, floors across different tenors and strikes, by which assumptions we aggregate them and how we apply a 'stochastic alpha, beta, rho' model in order to fine-tune the volatility smile.
- *The data maintenance.* One of the weaknesses of spreadsheet-based pricing software is the inability to work with precise historical data; historical pricing requires an ad-hoc infrastructure where a great amount of seemingly unrelated information has to be stored correctly and retrieved efficiently.

### Why is a black-box model not acceptable?

**MF:** A black-box model, by definition, lacks transparency. Our clients do not find it satisfactory to outsource the valuation process to an independent third party, which simply converts input data into output. Given the regulatory framework, it is now of vital importance to explain the value of a derivative component by understanding the following:

- Whether all of the correct conventions and deal specifications are adopted in the model.
- the data sources and how the model is calibrated to the relevant data set.
- the type of model utilised and its detailed implementation.

### What are the milestones and key features of the models implemented in your platform?

**MF:** While industry-standard models exist for the valuation of a large proportion of the derivatives instrument universe, quick spreadsheet-based solutions and off-the-shelf software rarely cover the entirety of your portfolio with an integrated approach. Furthermore, they necessitate validation, maintenance and neglect operational risks.

Bloomberg's approach is to preliminarily test extensively alternative models on the same security and to provide high disclosure on the robustness of the model, its assumptions and its calibration.

Our models' gestation is multifaceted, initiating from a consistent theoretical formulation. It continues with an attentive validation from our quant and developer teams, and we rarely found a model that was popular in the financial literature not to be stable under certain market conditions or data sets available.

Once our model is developed and most efficiently calibrated, it is accessible from the Bloomberg Terminal™, our trading systems and in Excel format to provide consistency and diminish operational risk.

### How can credit risk be incorporated into the valuation process?

**MF:** There is no consensus in the market about how credit risk can be homogeneously incorporated into the valuation of complex derivatives-based securities (as well as non-derivatives-based cashflow streams), also at a portfolio level.

We often witness the combination of more traditional approaches (such as collateral requirements) and more innovative ones (such as the adoption of risky discounting at a single-leg level or at a counterparty aggregate position level).

Our response to this imperative need is to provide a flexible solution, where the creditworthiness of the counterparty can be allowed for at different levels of the cashflow stream: on a single leg, on a multilegged security (i.e., a swap) and on aggregates.

A uniform measure of credit risk that Bloomberg uses across different products is the option adjusted spread, which we define as the credit spread that is added to the discounting rates in order to match the aggregate present value of all cashflows with the invoice payment. This measure of creditworthiness takes into account the volatility assumptions and the value of any embedded option premiums, such as call schedules, range premiums, caps and floors.

Bloomberg also employs another innovative method to price structured notes on rates. Since most short-term note issuers have a liquid term-structure of CDS quotes, we discount a structured note with a CDS curve by using the following method:

- The term structure of the CDS is stripped in order to obtain a term structure of hazard rates, from which the default probability  $Q_t$  is calculated for an arbitrary future time  $t$ .
- The following step is to determine the CDS-adjusted par coupon for each maturity by discounting the cashflows of a hypothetical risky coupon bond priced at par by the risk-free discount factors, combined with the default probabilities and assuming a given bond recovery rate.
- Bloomberg then adds hazard rates to the risk-free coupon curve to obtain a risky coupon curve; it applies the stripping method to the par curve determined by the CDS-adjusted par coupons to obtain the risky discount factors.
- The final step is to present the value of the structured note cashflows using the risky discount factors, therefore obtaining clean and dirty prices, embedded option values, greeks, etc.